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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/073,877	02/14/2002	Takayuki Watanabe	020166	6745

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EXAMINER

GUERRERO, MARIA F

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/073,877

Applicant(s)

WATANABE ET AL.

Examiner

Maria Guerrero

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-5, 7-10, 12 and 15-25 is/are pending in the application.
- 4a) Of the above claim(s) 7, 8, 12, 15, 16 and 23-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2, 17 and 19-22 is/are rejected.
- 7) ☒ Claim(s) 3-5, 9, 10 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. This Office Action is in response to the Amendment and the Request for continued examination filed October 8, 2004.

**Status of Claims**

2. Claims 1, 6, 11, and 13-14 are canceled. Claims 2-5, 7-10, 12, 15-25 are pending.

***Continued Examination Under 37 CFR 1.114***

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 8, 2004 has been entered.

***Priority***

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Election/Restrictions***

5. Applicant's election of Species I (claims 2-5, 9-10, 17-22) in Paper filed March 17, 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 7-8, 12, 15-16, 23-26 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper filed March 17, 2004.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper et al. (U.S. 5,242,857) in view Adachi et al. "Chemical Etching of InGaAsP/InP DH Wafer".

Cooper et al. teaches forming a stacked structure of a first III-V compound semiconductor layer (3) (InGaAsP) containing In and having a composition different from InP and forming a second III-V compound semiconductor layer (4) (InP) containing In directly on the first III-V compound semiconductor layer (Fig. 3d, col. 6, lines 30-35).

Cooper et al. shows growing an InP layer (5,6,7) at regions adjacent to the stacked structure to form a stepped structure of InP (Fig. 3e, col. 6, lines 37-50). Cooper et al. discloses the stepped structure and the stacked structure together forming a composite structure (Fig. 3e). Cooper et al. teaches wet-etching the composite structure to produce an etched structure (Fig. 3f, col. 8, lines 67-68, col. 9, lines 1-2).

Cooper et al. does not expressly teach wet-etching the composite structure using an etchant containing hydrochloric acid and acetic acid. However, Adachi et al. teaches using the etchant containing hydrochloric acid and acetic acid to etch an InP layer (Table 1, page 1054). Adachi et al. also teaches the etchant comprising water and or hydrogen peroxide (Table 1, page 1054).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Otsuka et al. process by including the use of the etchant contain hydrochloric acid and acetic acid as taught by Adachi et al. in order to better control the etching process.

7. Claims 2, 17, 19, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa et al. (U.S. 4,719,633) in view of Otsuka et al. (U.S. 5,568,501) and Adachi et al. "Chemical Etching of InGaAsP/Inp DH Wafer".

Yoshikawa et al. teaches forming a stacked structure of a first III-V compound semiconductor layer and a second III-V compound semiconductor layer formed on directly on the a first III-V compound semiconductor layer (Fig. 3, col. 2, lines 36-50). Yoshikawa et al. discloses growing a third III-V compound semiconductor layer at

Art Unit: 2822

regions adjacent the stacked structure to form a stepped structure (Fig. 3, col. 2, lines 39-42). Yoshikawa et al. shows the stepped structure and the stacked structure together forming a composite structure (Fig. 3). Yoshikawa et al. teaches etching the composite structure to produce an etched structure provided with a planarized surface (Fig. 4, col. 2, lines 58-67).

Yoshikawa et al. does not specifically show the stacked structure comprising the specific III-V compounds as claimed. However, Yoshikawa et al. teaches that the compound semiconductor material including InP and other multi-element compound semiconductor crystal materials can be applied (col. 5, lines 11-17).

Furthermore, Otsuka et al. teaches forming a stacked structure of a first III-V compound semiconductor layer (2) (InGaAsP) containing In and having a composition different from InP and forming a second III-V compound semiconductor layer (20) (InGaAsP) containing In directly on the first III-V compound semiconductor layer (Fig. 1A-2A, 3A-3B, col. 6, lines 55-67, col. 7, lines 1-5, 30-40). Otsuka et al. shows growing an InP layer (6) at regions adjacent the stacked structure to form a stepped structure of InP (Fig. 2A, 3C, col. 7, lines 9-15, 30-35). Otsuka et al. teaches obtaining a planar surface on a (001) plane (Fig. 2A, 3C, col. 8, lines 30-33, col. 14, lines 35-45).

Yoshikawa et al. does not expressly teach wet-etching the composite structure using an etchant containing hydrochloric acid and acetic acid. However, Adachi et al. teaches using the etchant containing hydrochloric acid and acetic acid to etch an InP layer (Table 1, page 1054). Adachi et al. also teaches the etchant comprising water and or hydrogen peroxide (Table 1, page 1054).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Yoshikawa et al. reference by including the III-V compound semiconductor taught by Otsuka et al. and to use the etchant contain hydrochloric acid and acetic acid as taught by Adachi et al. in order to provide a process of forming a multi-layer semiconductor laser comprising InP and having better control during the etching process.

***Allowable Subject Matter***

8. Claims 3-5, 9-10, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

9. Applicant's arguments with respect to claims 2, 17, and 19-22 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Iga et al. (U.S. 5,236,864) teaches several steps related to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

October 25, 2004

*Maria Guerrero*  
**MARIA F. GUERRERO**  
**PRIMARY EXAMINER**